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A search-theoretic explanation for the negative correlation between labor income and impatience

Rubens Penha Cysne

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A Search-Theoretic Explanation For the Negative Correlation Between Labor Income and Impatience*

Rubens Penha Cysne†

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Abstract

Lawrance (1991) has shown, through the estimation of consumption Euler equations, that subjective rates of impatience (time preference) in the U.S. are three to five percentage points higher for households with lower average labor incomes than for those with higher labor income. From a theoretical perspective, the sign of this correlation in a job-search model seems at first to be undetermined, since more impatient workers tend to accept wage offers that less impatient workers would not, thereby remaining less time unemployed. The main result of this paper is showing that, regardless of the existence of effects of opposite sign, and independently of the particular specifications of the givens of the model, less impatient workers always end up, in the long run, with a higher average income. The result is based on the (unique) invariant Markov distribution of wages associated with the dynamic optimization problem solved by the consumers. An example is provided to illustrate the method.

1 Introduction

More impatient workers (those with higher time preference) tend to accept wage offers that less impatient workers would not. By these means, their

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†Professor of Economics at the Getulio Vargas Foundation Graduate School of Economics (EPGE/FGV) and, in 2004, a Visiting Scholar at the Department of Economics of the University of Chicago. E-mail:rpcysne@uchicago.edu.

wages, over the employment/unemployment cycles, when they are employed, tend to be sometimes lower than the minimum wage acceptable by less impatient workers. However, when both more impatient and less impatient workers face the same circumstances, regarding the job market, the former, for the same reason (having a lower reservation wage), tend to remain less time unemployed.

Since these two facts have opposite effects in the determination of the long-run average wage, the effect of the time preference parameter on this variable is at first not clear from a theoretical perspective.

From an empirical perspective, though, Lawrance (1991) estimated consumption Euler equations using the Panel Study of Income Dynamics and showed that subjective rates of time preferences can be up to 6 percentage points higher in the top 5 percent of the wage distribution than in the bottom fifth percentile. Two possible explanations of such a pattern have been offered by this author. First, credit constraints (in which case financing the smoothing of consumption during a training period would not be feasible, leading more impatient consumers to lower investments in human capital); and, second, the existence of socioeconomic variables which, following this author, would determine at the same time both a higher impatience and a lower level of long-run labor income.

Lawrance's result suggests that models describing the long-run dynamics of the job market should be able to deliver, at least for some specifications of the distribution of wage offers and for some values of the parameters, a negative correlation between average labor income and impatience. In this paper I use a modified version of McCall's (1976) classical model of job search to show that, actually, less impatient workers always end up better off in the long-run, regarding the average wage, than more impatient workers. The conclusion does not depend on particular specifications of the givens of the model. The two effects of opposite sign to which I have referred before, therefore, happen to have one dominated by the other.

I show these facts by calculating, as a function of the time-preference parameter, the invariant Markovian distribution of the labor income of a given worker (which also coincides with the Markovian distribution of wages in the economy as a whole) and finding the average wage (of a given worker) under this distribution.

2 The Model

The givens of the problem, known by all maximizing agents, are a non-degenerated distribution of wage offers, from which workers make independent draws, a probability of being laid off each period, and a probability, also each period, of not having a (new) wage offer.

The basic model presented here, except for the fact that I am considering a probability α that the worker does not get a job offer next period, is the same as Stokey and Lucas's (1989, c. 10) version of McCall's model. The reader should refer to this source for the demonstrations marked below as standard.

Our group of workers are indexed by $[0,1]$. For all purposes, one can think of a small country in which workers receive their job offers from foreign firms.

Consider the measurable space $(\Omega, \mathcal{F}, p)$ and, in this space, the measure q induced by the wage function w: $\Omega \rightarrow [0, D]$ (with $0 < D < \infty$). In the induced space $\left([0,D], \mathcal{B}_{[0,D]}, q\right)$, denote by $F(t)$ the distribution function that ($q - a.e.$ -uniquely) determines the measure q : $F(t) = p(w \leq t)$. The distribution $F(.)$ satisfies:

$$Ew > 0 \tag{1}$$

The (representative) worker is not allowed to borrow or to lend. His consumption c_t is equal to his income w_t in each period. The consumer maximizes the expected present value of consumption $E\left(\sum_{t=0}^{\infty} b^t c_t\right)$. By assumption:

$$0 < b < 1 \tag{2}$$

State "w" corresponds to a job offer w at hand, and state "0" to no job offer that period. In state w the worker can accept or turn down the offer. If he accepts it, by assumption he is employed with that wage, facing, each period, a probability of unemployment given by θ, $0 < \theta \leq 1$. If he does not accept the offer he will be this period in state 0. Being in state zero the only thing he can do is wait next period for a possible job offer (which happens with probability $1 - \alpha$, $0 \leq \alpha < 1$. The compensation wage he receives when in state zero is considered to be negligible and left out of the model. While employed, the individual is not allowed to search for wage offers.

With $v(w)$ stating for the value function when the state is "wage offer w at hand", $\mathcal{A}$ for accept and $\mathcal{R}$ for reject, the recursive version of the consumer's problem is given by:

$$v(w) = \max_{\mathcal{A},\mathcal{R}} \left\{ w + \beta\left[(1-\theta)v(w) + \theta v(0)\right], v(0) \right\} \tag{3}$$

where

$$v(0) = \beta\left[(1-\alpha)\int_{[0,D]} v(w')dF(w') + \alpha v(0)\right]$$

Making $X = \frac{1-\alpha}{1-\alpha\beta}$:

$$v(0) = \beta X \int_{[0,D]} v(w')dF(w') \tag{4}$$

Proposition 1 *There is a unique bounded continuous and weakly increasing function $v(.)$ satisfying (3).*

Proof. Standard. ■

Proposition 2 *There is a unique $\bar{w} \in [0, D]$ such that:*

$$v(w) = \begin{cases} v(0) \quad (= \bar{w} + \beta v(0)) & \text{if } w \leq \bar{w} \\ \frac{w+\beta\theta v(0)}{1-\beta(1-\theta)} & \text{if } w > \bar{w} \end{cases} \tag{5}$$

Proof. Standard. ■

Proposition 3 *In Proposition 2, $\bar{w}$ (the reservation wage) is determined by:*

$$\bar{w} = \frac{\beta(1-\alpha)}{1-\beta(1-\theta)} \int_{[\bar{w},D]} (w' - \bar{w})dF(w') \tag{6}$$

Proof. From (4) and (5):

$$v(0) = X\beta \int_{[0,\bar{w}]} v(0)dF(w') + X\beta \int_{[\bar{w},D]} \frac{w' + \beta\theta v(0)}{1-\beta(1-\theta)} dF(w')$$

Collecting terms:

$$v(0) = \frac{X\beta}{(1-\beta)(1-\beta F(\bar{w})X) + (1-\beta X)\beta\theta} \int_{[\bar{w},D]} w' dF(w')$$

Use the fact that, from (5), $v(0) = \bar{w}/(1-\beta)$ and the definition of the variable X to get:

$$\bar{w} = \frac{\beta(1-\alpha)}{1-\beta(\alpha + F(\bar{w})(1-\alpha) - \theta)} \int_{[\bar{w},D]} w' dF(w')$$

Next, add and subtract $\int_{[\bar{w},D]} \bar{w} dF(w')$ to the second member of the equation above and collect terms to get (6). ■

Proposition 4 *The reservation wage is an increasing function of the worker's patience (β), a decreasing function of the probability of finding no job offers in the next period (α) and a decreasing function of the probability of layoff θ.*

Proof. The second and third assertions follow immediately from (6). Regarding the first one, define:

$$G(\bar{w},\beta) = \bar{w} - \frac{\beta(1-\alpha)}{1-\beta(1-\theta)} \int_{[\bar{w},D]} (w' - \bar{w}) dF(w')$$

and observe that $G_{\bar{w}} = 1 > 0$ and $G_{\beta} < 0$. The result $\bar{w}'(\beta) > 0$ follows (under (1) and (2)) from the implicit function theorem. ∎

3 A Trivial Case

We have seen above that there are two effects of opposite sign determining the long run average wage. On the one hand, the fact that more patient workers do not accept offers that less patient workers sometimes do. This point acts in favor of the average wage of more patient workers. On the other hand, by not accepting these low offers, more patient workers end up being unemployed at times when less patient workers, with equivalent offers, get the job. This acts against the average wage of more patient workers.

Now suppose that the probability of unemployment (θ) is equal to zero (to simplify, assume the same for α, even though it is not necessary for the argument). Then, in the limit, the second effect does not exist anymore and, therefore, it should be trivial proving that more patient workers end up better off in the average. This is done in this section, just for the purpose of enhancing the intuition about the problem.

Since in the next section the general demonstration is carried out with a distribution function that happens to have a density, here I prove the result, for a change (in which turns out to be an analytically less comfortable setting), assuming a discrete distribution. A single application of the law of large numbers suffices (the Glivenko-Cantelli theorem can be used in this case[1]).

Proposition 5 *Consider two economies,* 1 *and* 2*, each one operating under the rules of the model presented in section* 2*, with* $\theta = \alpha = 0$*. In economy* j*,* $j = 1, 2$*, all workers have a time-preference parameter equal to* β_j*,with* $\beta_2 > \beta_1$*. Wage offers are given by measure* q*. Suppose that the wages in the support of* q *are indexed in nondecreasing order:*

$$0 = w_1 \leq ...w_{a_1-1} \leq w_{a_1} \leq w_{a_2} \leq ...w_{a_x} \leq ... \leq w_{a_n} = D \tag{7}$$

[1] See, e.g., Ferguson (1996, p. 23)

Denote the probability masses on these points, respectively, by $q_1, ...q_{a_1-1}, q_{a_1}, ..., q_{a_x}, ...q_{a_n}$. *Then, the average wage* (w_A) *of the workers in economy* 2 *will be no less than the average wage in economy* 1 ($w_{A2} \geq w_{A1}$).

Proof. Make $A(j) = [\bar{w}(j), D]$, where $\bar{w}(j)$ is the reservation wage of economy j. Since the n-th highest draw among n draws from measure q (which has its support contained in the compact set $[0, D]$) converges in measure to D, after a certain number of draws all workers, in each economy j, can be considered to be employed with a wage $w \in A(j)$. Suppose that the wages in the support of q are indexed in nondecreasing order:

$$w_1 \leq ...w_{a_1-1} \leq w_{a_1} \leq w_{a_2} \leq ...w_{a_x} \leq ... \leq w_{a_n} \tag{8}$$

Call $w_{a_1}(1)$ is the first wage no less than the reservation wage of economy 1 ($\bar{w}(1)$), meaning, that a_1 (1) satisfies $w_{a_1} \geq \bar{w}(1) \geq w_{a_1-1}$. After a certain number of draws the average wage in economy 1 ($w_A(1)$) can be considered to be given by:

$$w_A(1) = \frac{1}{q(A(1))} \int_{A(1)} w dq = \frac{\sum_{i=a_1}^{a_n} w_i q_i}{\sum_{i=a_1}^{a_n} q_i}$$

Since by assumption $\beta_2 > \beta_1$, and since the reservation wage, by Proposition 2 (with $\alpha = \beta = 0$), is an increasing function of β, we can make $\bar{w}(2) = \bar{w}(1) + \Delta\bar{w}$ where $\Delta\bar{w} \geq 0$. Therefore, in economy 2, either it still happens that $w_{a_1} \geq \bar{w}(2) = \bar{w}(1) + \Delta\bar{w} \geq w_{a_1-1}$, in which case the average wage in the two economies coincide, or that, for $n > x > 1$, $w_{a_x} \geq \bar{w}(2) \geq w_{a_x-1} \geq w_{a_1}$ and

$$w_A(2) = \frac{\sum_{i=a_x}^{a_n} w_i q_i}{\sum_{i=a_x}^{a_n} q_i}$$

In this second case, the average wage in economy 2 is no less than the average wage in economy 1 due to the general fact that, given (8), for any $x > 1$:

$$\frac{\sum_{i=a_1}^{a_n} w_i q_i}{\sum_{i=a_1}^{n} q_i} \leq \frac{\sum_{i=a_x}^{a_n} w_i q_i}{\sum_{i=a_x}^{a_n} q_i}$$

This is equivalent to having:

$$\sum_{i=1}^{k-1} \sum_{j=k}^{n} q_i q_j w_i \leq \sum_{i=1}^{k-1} \sum_{j=k}^{n} q_i q_j w_j$$

which is true by (8). ∎

Although illustrative, this example is a simple consequence of the fact that $\bar{w}(2) \geq \bar{w}(1)$. This implies that after the draws have been taken by all workers in each economy one is actually averaging two groups of numbers, the first of which has a lower bound no greater than the second. This trivially implies $w_A(2) \geq w_A(1)$.

4 The General Case

The transition dynamics in this section draws upon a similar problem analyzed by Stokey and Lucas (1989, c. 10).

The reservation wage $\bar{w}(j)$ divides $[0, D]$ into two regions: the acceptance region $A(\beta) = [\bar{w}(\beta), D]$ and the non-acceptance region $A^c(\beta) = [0, \bar{w}(\beta)]$.

The rules of the optimization followed by the worker define a transition function $P : [0, D] \times \mathcal{B}_D \to [0, 1]$. If the current state (given by the wage offer) is $w \in A^c$, the probability of having an offer next period in any borelian $B \subset [0, D]$ is given by $(1 - \alpha)q(B) + \alpha$, if $0 \in B$, and $(1 - \alpha)q(B)$ if $0 \notin B$. Alternatively, if the current state is $w \in A$, the worker can only lose his job (with probability θ) or keep the same wage next period. Therefore, with probability zero he will have a wage next period in a borelian B that does not contain either 0 or w. If the borelian B contains 0, but not w, or w but not zero, the transition probabilities are, respectively, θ and $1 - \theta$. If it contains both, since these are disjoint events (because $0 \notin A$), $P(w, B) = 1$. This transition function implies the only ergodic set of the problem to be the whole (induced) sample space, $[0, D]$.

Let $\Lambda([0, D],\mathcal{B}_{[0,D]})$ denote the space of probability measures defined in $([0, D],\mathcal{B}_{[0,D]})$. Consider a new measure λ_t in $([0, D],\mathcal{B}_{[0,D]})$, representing the wage offers of a certain worker at time t and a operator T^*, defined on $\Lambda([0, D],\mathcal{B}_{[0,D]})$, by:

$$(T^*\lambda)(B) = \int P(w, B)\lambda(dw), \quad \lambda \in \Lambda, \ B \in \mathcal{B}_{[0,D]} \tag{9}$$

$\Lambda([0, D], \mathcal{B}_{[0,D]})$, when endowed with the total variation norm, is a complete metric space.

In order to talk about an invariant distribution of wages in this economy, it is necessary to show that the distribution of wage offers has one and only one fixed point under the operator T^*. For the demonstration of this important point it suffices, by the contraction theorem, proving that, for some $N \geq 1$, T^{*N} is a contraction in the metric space $\Lambda([0, D],\mathcal{B}_{[0,D]})$. Indeed, since $\Lambda([0, D],\mathcal{B}_{[0,D]})$ is a complete metric space, if T^{*N} can be shown to be a contraction, by the N-stage contraction theorem (see Corolary 2 of theorem 3.2 in Stokey and Lucas), T^* admits one and only one fixed point in $\Lambda([0, D],\mathcal{B}_{[0,D]})$.

Proving that T^{*N} is a contraction, therefore, is the only thing we have to do here. This can be easily done with the help of Lemma 11.11 and exercise 11.5a in Stokey and Lucas (1989). Following these results, for T^{*N} to be a contraction in $\Lambda([0, D],\mathcal{B}_{[0,D]})$ it suffices to show that there exists a point $w_0 \in [0, D]$, an integer $N \geq 1$, and a number $\epsilon > 0$, such that $P^N(w, \{w_0\}) > \epsilon$ for all $w \in [0, D]$.

Proposition 6 *The adjoint operator T^* of the transition function P defined above has one and only one unique fixed point. This fixed point is the invariant measure of wage offers defined in* $([0, D], \mathcal{B}_{[0,D]})$ *by (9).*

Proof. Take $N = 2$ and $w_0 = 0$. From what we saw about the transition function P, there are two cases to consider: if $w \in A = [\bar{w}, D]$, $P^2(w, \{w_0\}) = \theta m_w(A^c) + (1-\theta)\theta$. Alternatively, if $w \in A^c = [0, \bar{w})$, $P^2(w, \{w_0\}) = m_w(A^c)m_w(A^c) + m_w(A)\theta$. Take

$$\varepsilon = \frac{1}{2} \min \{\theta m_w(A^c) + (1-\theta)\theta,\ m_w(A^c)m_w(A^c) + m_w(A)\theta\}$$

Then, $\epsilon > 0$ and $P^N(w, \{w_0\}) = P^2(w, \{0\}) > \epsilon$, all $w \in [0, D]$. This proves that T^{*N} is a contraction. The result then follows from the N-stage contraction theorem. The second assertion follows by definition. ■

The next step is deriving the limiting measure of the state of the economy, particularly for sets $C \subset A$ (of employed workers).

A worker, in period $t+1$, is employed with wage $w \in C$, if and only if he was unemployed and got a wage offer $w \in C$ or he was already employed with wage w in the beginning of period $t+1$ and kept his job. Given the assumed independence of job offers in each period, we can write

$$\lambda_{t+1}(C) = \lambda_t(A^c)(1-\alpha)q(C) + \lambda_t(C)(1-\theta) \tag{10}$$

The determination of the long-run measure $\lambda(C) = lim_{t\to\infty}\lambda_t(C)$ requires the calculation of $\lambda_t(A^c)$. Since a worker is unemployed in period $t+1$ iff he was already unemployed and drew a wage offer in A^c or was employed and lost his job, we have:

$$\lambda_{t+1}(A^c) = \lambda_t(A^c)\left[(1-\alpha)q(A^c) + \alpha\right] + \lambda_t(A)\theta \tag{11a}$$

Taking limits, equation (11a) trivially implies $\lambda(A^c) = \theta / \left[\theta + q(A)(1-\alpha)\right].$ Taking limits in (10) and using this result yields, for $C \subset A:$

$$\lambda(C) = \lim_{t\to\infty} \lambda_t(C) = \frac{(1-\alpha)q(C)}{\theta + (1-\alpha)q(A)}$$

We are now ready to calculate the average wage in each cohort j of the economy. This is given by:

$$w_A(\beta) = \int_{[\bar{w}(\beta), D]} \frac{(1-\alpha)w dq}{\theta + (1-\alpha)q(A)} \tag{12}$$

where $\bar{w}(\beta)$ follows (6).

Consistently with the observation we have made before, that there are two effects of opposite sign determining the effect on w_A, when β is allowed to change, it is not clear from (12), at first glance, if the average wage is an increasing function of the time-preference parameter or not. Indeed, as β increases, so does the reservation wage, leading to a fall of $q(A)$. At the same time, though, the region of integration in (12) increases.

Proposition 7 below delivers the main result of this paper, for the case in which $F(w)$ is absolutely continuous.

Remark 1 [2]*$F'(w)$ exists and is absolutely continuous a.e. in $[0, B]$, with $F'(w) \equiv f(w) > 0$ for $(q - a.e)$ all w in $[0, D]$.*

Proposition 7 *Under Remark 1, the average wage is an increasing function of the time preference parameter β.*

Proof. Using the distribution function F and its respective density function $(f(w))$ with respect to the Lebesgue measure in $\mathbb{R}$, it follows from the result above that the average wage is now given by:

$$w_A(\beta) = \frac{(1-\alpha)}{\theta + (1-\alpha)(1 - F(\bar{w}(\beta))} \int_{[\bar{w}(\beta), D]} w f(w) dw \tag{13}$$

In the following I omit the argument β in the functions. Taking the derivative in (13) with respect to $\bar{w}$:

$$\frac{\partial w_A}{\partial \bar{w}} = \frac{f(\bar{w})(1-\alpha)(\int_{[\bar{w},D]}(w - \bar{w})f(w)dw + \bar{w}\left[-\theta + \alpha(1 - F(\bar{w})\right])}{(\theta + (1-\alpha)(1 - F(\bar{w}))^2}$$

The expresson of the reservation wage given by (6) allows us to write:

$$\frac{\partial w_A}{\partial \bar{w}} = \frac{f(\bar{w})(1-\alpha)\bar{w}(1-\beta)}{\beta\left[\theta + (1-\alpha)(1 - F(\bar{w})\right]^2} > 0 \tag{14}$$

By the chain rule, $w_A'(\beta) = \frac{\partial w_A}{\partial \bar{w}} \frac{\partial \bar{w}}{\partial \beta}$. The result follows from (14) and Propositon 2. ■

[2] Remember the definition of $F(w)$ as the distribution function determined by q.

Example 1 *Consider an economy in which, each period, workers face a probability θ of layoff and a probability α of having no wage offer next period. Suppose that q is the Lebesgue measure in $[0,1]$. Using (6):*

$$\bar{w}(\beta) = \left[\frac{1-\beta(\alpha-\theta)}{\beta(1-\alpha)} - \sqrt{(\frac{1-\beta(\alpha-\theta)}{\beta(1-\alpha)})^2 - 1}\right] \tag{15}$$

By (12), the average wage reads:

$$w_A(\bar{w}(\beta)) = \frac{(1-\alpha)\,(1-\bar{w}^2)}{2\,[\theta+(1-\alpha)(1-\bar{w})]} \tag{16}$$

To obtain the sign of $\bar{w}'(\beta)$ in (15) make $z(\beta) = \frac{1-\beta(\alpha-\theta)}{\beta(1-\alpha)}$, and note that $\bar{w}(z(\beta)) = h(z) = z - \sqrt{z^2-1}$. Use the chain rule and the fact that $h'(z) < 0$ for $z > 1$ (as it happens to be the case) and $z'(\beta) < 0$ to get $\bar{w}'(\beta) > 0$. Use the chain rule again to conclude that to show that $w_A'(\bar{w}(\beta)) > 0$ suffices showing that $w_A'(\bar{w})$, at the value of $\bar{w}$ endogenously determined by β (note that, accordingly, in the demonstration of Proposition 3 we had to use the expression for $\bar{w}$ as a function of β), is strictly positive as well.

Taking the derivative in (16) with respect to $\bar{w}$ leads to:

$$w_A'(\bar{w}) = \frac{(1-\alpha)^2\left[\bar{w}^2 - \frac{2(\theta+1-\alpha)}{1-\alpha}\bar{w} + 1\right]}{2\,[\theta+(1-\alpha)(1-\bar{w})]^2}$$

Make $g(w) = w^2 - \frac{2(\theta+1-\alpha)}{1-\alpha}w + 1$. Note that $w_A'(\bar{w}) > 0$ if $g(\bar{w}(\beta)) > 0$. But $g(\bar{w})$ has only one root between zero and one, which is given by:

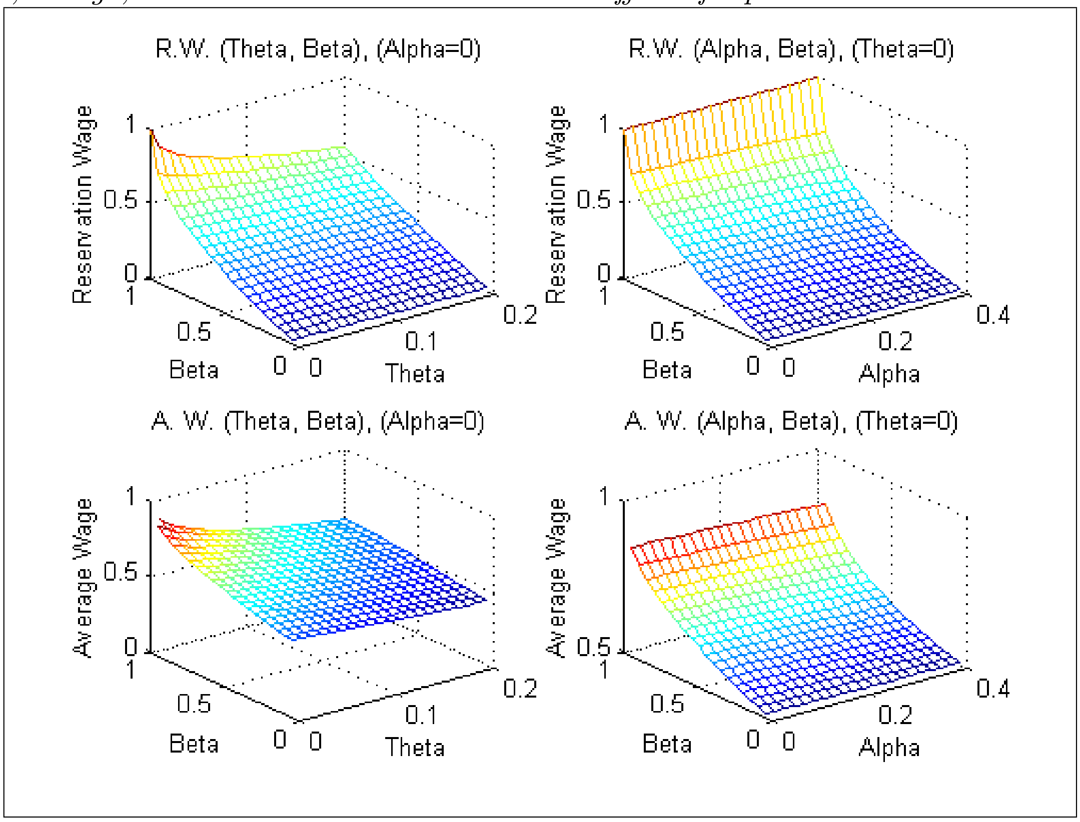
$$\bar{w}_1 = \frac{\theta+1-\alpha}{1-\alpha} - \sqrt{(\frac{\theta+1-\alpha}{1-\alpha})^2 - 1}$$

Since $g''(\bar{w}) = 2 > 0$, all we have to prove is that $\bar{w}(\beta) < \bar{w}_1$ (this implies $g(\bar{w}(\beta)) > 0$). This can be done with the help of the function $h(z)$ defined above.

Since $h'(z) < 0$, if we can show that $\frac{1-\beta(\alpha-\theta)}{\beta(1-\alpha)} > \frac{\theta+1-\alpha}{1-\alpha}$ (meaning, the z in the determination of $\bar{w}(\beta)$ is greater than the z in the determination of $\bar{w}_1$) then $\bar{w}(\beta) < \bar{w}_1$.But $\frac{1-\beta(\alpha-\theta)}{\beta(1-\alpha)} - \frac{\theta+1-\alpha}{1-\alpha} = \frac{1-\beta}{\beta(1-\alpha)} > 0$. The reservation wage and the long-run average wage for this example are illustrated in Figure 1, below, first as a function of beta and teta, with $\alpha = 0$, and then as a function of beta and alpha, with $\theta = 0$.

As one can observe from the figure, if theta is very close to zero, the reservation wage tends to one when β tends to one. Intuitively, the worker with beta close to one will reject a very big percentage of all offers, remaining with a wage equal to zero, whereas the worker with lower beta might accept and go on keeping his average away from zero. With theta very close to zero, though, once the patient worker accepts an offer, he remains employed with that wage for a very very long period of time, eventually catching up with the less patitent worker and ending up, in the long-run, with a higher average.

Note, also, that the tendency of the reservation wage to get close to one is reverted when theta increases, but not when alpha increases. When either alpha or theta increase, both the reservation wage and the average wage decrease. The effect of theta over the reservation wage and over the average wage, though, is much more noticiable than the effect of alpha.



5 Conclusions

The empirical evidence provided by Lawrance (1991) has shown that subjective rates of time preferences can be up to 6 percent higher in the top 5 percent of the income distribution than in the bottom fifth percentile. Given any exogenous distribution of wages, as well as time preferences, probability of unemployment and probability of not finding a job offer next period, I have shown that Lawrance's result can be theoretically supported by the well known mechanism of an intertemporal job-seach model, even though the result is not clear at first glance, due to the existence of two effects pointing out in opposite directions. An example was provided to illustrate the method.

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